ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

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217-782-5504



August 20, 2003

Mr. Ronald B. St. John, PG
Clayton Group Services, Inc.
3140 Finley Road
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Refer to: 0430555004 – DuPage County
Lisle/Lockformer
Superfund/Technical Reports

The Illinois Environmental Protection Agency (Illinois EPA) has completed review of the Remedial Action Plan (RAP) for Areas 1 and 2 submitted on July 11, 2003 by Clayton Group Services for the above referenced site. The Illinois EPA has the following comments.

1. ***Groundwater Flow in the Mass Waste Unit:*** An argument is made in the RAP that the mass waste unit in the northern portion of Area 2 (as far south as cross-section A-A' on Figure 2.1-6) is not saturated. The groundwater containment remedy that is recommended subsequently ignores this area of the site. However, this claim does not appear to be supported with sufficient evidence:

   - In cross-section A-A', Figure 2.1-6, a constant groundwater elevation of 655' is shown throughout the cross-section, located below the mass waste unit. However, it is unclear how this groundwater elevation was determined. No groundwater wells along this cross-section are screened within the mass waste unit, and could not have been used to determine such an elevation.
   - Two groundwater samples were, in fact, collected from the mass waste unit at the western boundary of cross-section A-A' (CSB-1839 and CSB1840).
   - At least one soil boring log (CSB-1817) indicates that approximately 3 feet of saturated thickness exist in the mass waste unit, although cross-section A-A' does not reflect this fact.

- Groundwater elevations in the mass waste unit have historically fluctuated up to several feet. Such a fluctuation (compared with the groundwater elevation shown in cross-section A-A') would cause a majority of the boring locations to exhibit saturated mass waste conditions.
- The fact that groundwater contamination was found in the mass waste unit at the far western boundary of the site (GW-1839 and GW-1840) appears to provide strong evidence that not only do saturated conditions exist in the mass waste unit, but that they provide a continuous flow pathway from the possible sources of this contamination located further to the east.

Any proposed remedy for achieving the groundwater remedial objectives at the site must assume that saturated conditions exist in the northern portion of Area 2.

2. ***Groundwater Containment:*** The proposed remedy for groundwater containment is the use of five separate pumping locations in the mass waste aquifer. The Illinois EPA believes that it will be difficult to demonstrate that such a system is adequately containing the contamination:
    - Little is actually known about flow patterns in the mass waste unit. The potentiometric surface map shown on Figure 2.1-8 indicates that a very flat gradient (0.003) exists across the site. Slight fluctuations in groundwater elevations could dramatically change local flow directions (and even saturated conditions within the aquifer, as noted above). Designing a well collection system that would effectively contain such an aquifer would be difficult given the existing data at the site.
    - The mass waste aquifer is fairly thin in many places (on the order of several feet); it is unlikely that this aquifer could be reliably modeled (Darcy's Law may not be valid, "undulating" and non-continuous saturated conditions, etc.).
    - Pumping relatively small flow rates from five points in a shallow aquifer will not likely contain the areal extent required to protect the western boundary of the site. The capture zone of each well is likely to be fairly limited in such a shallow (thin) aquifer. It appears there is reliance upon wide areas of the aquifer draining into the specific "undulations" into which the recovery wells are installed, but there is no evidence that adequately identifies the actual location of these drainage points to the required precision needed for such a capture strategy to work. No quantitative analysis demonstrating the effectiveness of this approach was submitted by Clayton; it is likely that none could be developed, given the existing data.

Because of the difficulty in demonstrating that complete capture of the mass waste aquifer would be achieved under the proposed remedy, an additional remedy should be evaluated as part of this feasibility study: a cutoff trench located at the western boundary from which groundwater would be pumped and treated (presumably at a similar rate as that proposed for the collection well scenario). Such a remedy would provide more assurance to the Illinois EPA that the groundwater remedial objectives will be achieved at the property boundary, and will provide a more reasonable approach to the containment of a thin aquifer.

3. ***Remedial Objectives in the Lower Till:*** Clayton has argued that development of remedial objectives for the lower till is "unreasonable". No regulatory mechanism within 35 Illinois Administrative Code Part 742 (TACO) framework allows for this claim. Remedial objectives are to be developed for each media at the site exceeding Tier I criteria. The lower till is no exception; to the contrary, the levels of contaminants present within this zone are such that they cannot be ignored. If the lower till is, in fact, protective of the lower bedrock aquifer, then an appropriate remedial objective can be developed based upon this fact.

**SPECIFIC COMMENTS**

1. The submitted document is actually a feasibility study, and not a Remedial Action Plan, according to Illinois EPA definitions. A RAP would require far more detail than is included in the current submission. The document should be renamed.
2. The basis upon which the groundwater elevations shown in the various cross-sections was developed should be provided.
3. The potentiometric surface map for the mass waste unit shown on Figure 2.1.8 appears to include data from wells that are not screened within the mass waste unit. (For example, MW-1114S and MW-1118). The screened intervals of all of the wells shown on this figure should be checked and revised accordingly.
4. Page 2, 3rd paragraph, Soil boring logs for CSB-1851 and CSB-1852 are not included in Appendix A.
5. Page 5, A plan-view map that shows the thickness of the lower silty-clay layer should be provided. This map should include locations that are used in preparation of this map and the lower silty-clay layer thickness at each of the locations.
6. Page 6, 2nd paragraph states, "The potentiometric surface map in Figure 2.1-8 suggests that bifurcated flow around the lower till high in the vicinity of MW-1105D causes groundwater west of CSB-1812 (cross-section Y-Y') to flow west toward Ogden Corporate Center property in the vicinity of monitoring wells MW-1123 and MW-1112S." What is the groundwater elevation in well MW-1105D? How does this elevation compare to the elevation of the lower till at this location? A table should be included summarizing groundwater elevations at the Site during the last several years to evaluate extent of water level fluctuations.
7. Page 8, 2nd paragraph, Figures 2.2-2 to 2.2-8. The instances when the extent of contamination above the lowest Tier 1 objective is inferred should be identified on these figures. For example, on Figure 2.2-4, the delineation north of CSB2083 and CSB2082 is inferred.
8. Page 9, 1st paragraph, The slug test data and analysis should be provided.
9. Page 9, last paragraph discusses the use of a retardation factor to modify the groundwater specific discharge. Illinois EPA does not allow the use of a retardation factor in this context. Instead, the groundwater velocity must be used.

10. Page 10, 2nd bullet. Combining RBCA equation R14 and SSL procedures is not appropriate. 35 IAC 742.700(e)(3) states that, "combining equations from Appendix C, Tables A through C to form a new model is not allowed. In addition, Appendix C, Tables A through C must use their own applicable parameters identified in Appendix C, Table B and D, respectively."

11. Page 10, 2nd paragraph, cis-1,2-dichloroethane and trans-1,2-dichloroethane have a cumulative effect on the circulatory system, not the central nervous system.

12. Page 10, last paragraph states, "However, since the cumulative effects of carcinogens need only be considered for groundwater in Tier 2 evaluations, and neither trichloroethene nor tetrachloroethene (using the existing RAOs as soil component of the GWRO) will coexist with each other or vinyl chloride at the downgradient property line (point of human exposure), weighted averages are not required." TACO does not allow the assumption that one or more compounds will not coexist at the property boundary. The Tier 2 groundwater objectives should be adjusted in accordance with 35 IAC 742.805(c) or (d) to ensure that the cumulative carcinogenic risk is less than 1 in 10,000.

13. Page 15, 1st paragraph states, "Additionally, SVE efforts are already taking place at the site targeted at removing contaminants in the unsaturated zone in the mass waste sand and gravel will likely desorb contamination from the lower till through volatilization." Page 16, 3rd bullet states that, "Contaminants sorbed into the interstitial matrix of the lower till are not expected to be mobile to any significant degree." How will the SVE system reduce the contamination in the till? These statements seem contradictory.

14. Page 23, 2nd paragraph. Which other PRB installation/emplacement techniques were considered as part of this evaluation? Have the feasibility and cost implications of recent advancements been considered? Recent alternatives that can install PRBs to depths of 100 feet include deep trenching machines, high pressure jetting, extended backhoes, and hydraulic clamshells (discussed in *In Situ Permeable Reactive Barriers: Application and Deployment Training Manual,* EPA/542/B-00/01, January 2000).

15. Page 26, last two bullets. A review of the literature (*Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater*, EPA/600/R-98/128, September 1998) has shown that complete anaerobic degradation via reductive dechlorination occurs along the following pathway: PCE $\rightarrow$ TCE $\rightarrow$ cis-1,2-DCE $\rightarrow$ VC $\rightarrow$ ethene $\rightarrow$ ethane. Aerobic oxidation processes have been shown to act as follows: cis-1,2-DCE or VC $\rightarrow$ $CO_2$ + $H_2O$.

16. Page 28, 2nd paragraph. What does the current data indicate about the viability of an in situ biological treatment technique? What are the on-site and off-site dissolved oxygen levels and oxidation-reduction potentials? What are the dissolved methane, ethane, and ethane levels? Is there an anaerobic, reducing environment present to degrade the chlorinated solvents present in groundwater?

17. Page 31, last paragraph. Add, "carbon substrates, " before "microorganisms or nutrients."

18. TACO Calculation Package, Groundwater contours should be shown on Figures 1 through 7 to assure that the distances to the compliance location are measured in a downgradient direction.

19. TACO Calculation Package, The source dimensions to be used in TACO calculations depend on the direction of groundwater flow. $S_w$ controls attenuation due to lateral dispersion and should be measured perpendicular to the direction of groundwater flow. W controls the effect of dilution at the source and should be measured in the direction of groundwater flow. The schematic on the attached figure shows the source dimensions to be used in TACO calculations. Please revise the source dimensions to reflect the groundwater flow direction.

20. TACO Calculation Package, Depending on the groundwater flow direction, the combined effect of several sources must be considered. For example, Figure 4 shows two sources with plumes that may overlap due to lateral dispersion.

21. TACO Calculation Package, The infiltration rate used to develop the leaching factor should be 30 cm/yr (35 IAC Part 742, Appendix C, Table D), rather then 7 cm/yr.

22. TACO Calculation Package, The leaching factor depends on the specific properties of the chemical of concern ($k_s$, H') and the source area geometry (W). The leaching factor was developed for each chemical separately, but for only one source geometry. An explanation should be given as to why only one source geometry was used.

23. TACO Calculation Package, A dilution factor of 20 was assumed in the calculation of the leaching factor. The leaching factor must be calculated using I, W, $U_{gw}$, $d_{gw}$ since SSL and RBCA parameters cannot be combined.

24. TACO Calculation Package, The analytical results for organic carbon content and porosity should be included. The locations where the samples were collected should also be shown.

If you have any questions or comments, please feel free to contact me at the above address or telephone number.

Sincerely,

Stanley F. Komperda
State Sites Unit
Remedial Project Management Section
Bureau of Land

CC: Howard Chinn, IAGO-Chicago
Steve Faryan, USEPA-Region V